



Human Effects Modeling Analysis Program Fact Sheet

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Non-lethal weapons provide our operating forces with escalation-of-force options that minimize casualties and collateral damage.

What Is It?

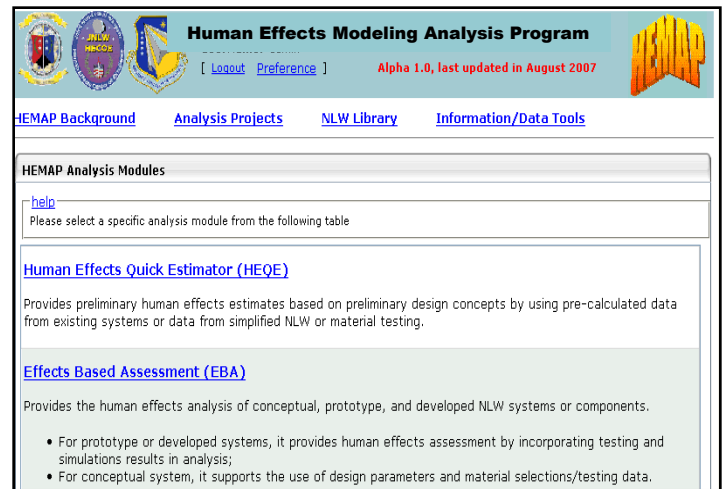
Non-lethal weapons are designed with the intent to minimize casualties and significant injuries, as well as undesired damage to property, in comparison with the use of lethal weapons in the same situations. Part of developing any new non-lethal weapon is assessing its human effects. To characterize the risk of a new escalation-of-force technology, the system must undergo extensive human effects and effectiveness analyses while the technology is still in development.

The Human Effects Modeling Analysis Program is a collection of detailed models that provide predictions for a range of human effects and permits a standardized and centralized approach for non-lethal weapon human effects assessments. This computer application tool was developed under the sponsorship of the Joint Non-Lethal Weapons Program to predict the human effects of specific non-lethal weapons and to include predictions of injury (risk of significant injury). This information is essential for system development, assessment, operational testing, training and operation.

The Human Effects Modeling Analysis Program includes the capability to assess injury potential from blunt trauma, thermal injury, blasts and acoustic stimuli, as well as the visual effects of broadband optical stimuli. Data from the modeling assessments allow developers to compare the benefits against the risks of a non-lethal weapon in specific operational scenarios.

How Does It Work?

Through experimentation, researchers generate data on the amount of non-lethal stimulus necessary to be effective yet minimize the risk of significant injury.



Screen shot of the Human Effect Modeling and Analysis Program Web application
Official Human Effects Modeling and Analysis Program Image

This includes developing dose-response curves. Researchers then use this information to develop or refine non-lethal human effects models. Researchers validate and verify the Human Effects Modeling Analysis Program to ensure the components are generating accurate and consistent predictions.

The Human Effects Modeling Analysis Program software application integrates validated non-lethal human effects data and other bio-effects models in a common modeling suite. The software models address all stages of non-lethal weapon development that influence the human effects. The majority of these models use finite element modeling to predict injury results. This standardized approach includes testing the non-lethal weapon, characterizing the stimulus, calculating the delivery of the stimulus to the target and predicting likely effects of the stimulus on the target.

Human Effects Modeling Analysis Program

Other Human Effects Modeling Analysis Program features include: models that enable development and improvement of non-lethal weapon systems based on the desired human effects; databases of non-lethal weapon systems and operational scenarios; and archives of Human Effects Modeling Analysis Program data and reference documents.

Human Effects Testing

The Human Effects Modeling Analysis Program enables comprehensive human effects assessments of a broad range of non-lethal stimuli and reduces the need for testing on animal and human subjects. The Human Effects Modeling Analysis Program supports various joint and Service-unique non-lethal weapons programs. The results of Human Effects Modeling Analysis Program assessments also support legal, treaty and policy reviews, as well as developmental and operational testing and evaluation.

Program Evolution

The Human Effects Modeling Analysis Program model was developed from the Advanced Total Body Model. Developers originally designed the Advanced Total Body Model to assess the human effects of kinetic-energy “blunt impact” non-lethal weapon systems. The Advanced Total Body Model uses a systematic research approach that combines advanced computational finite element modeling with experimental work to evaluate injury potential from non-lethal projectile impacts. Developers later expanded the capabilities of the Advanced Total Body Model into the Human Effects Modeling Analysis Program model to support payloads that deliver multiple physical stimuli and to provide a framework for crowd and behavior response models.

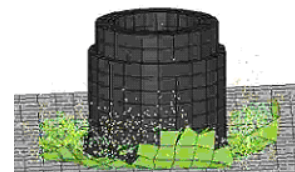
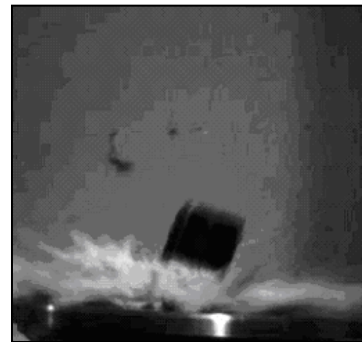
Future Human Effects Modeling Analysis Program plans include implementing human effects models associated with radio-frequency directed energy, thermal lasers, electro-muscular disruption, underwater acoustics and mild traumatic brain injury. Researchers will also continue to verify and accredit implemented models. Additionally, future

model development will include assessment of the risk of significant injury from non-lethal weapon systems, as well as behavioral response models.

Organizations Involved

The following organizations have participated in and plan to continue supporting Human Effects Modeling Analysis Program:

- Department of Defense
 - Joint Non-Lethal Weapons Program
 - Human Effects Center of Excellence, Fort Sam Houston, Texas
 - U.S. Army Test and Evaluation Command (ATEC)



These images illustrate the characterization and modeling of a non-lethal projectile.

Official Human Effects Modeling and Analysis Program Images



For further information, contact the JNLWD at 703-432-0905

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